LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES

OFFICE OF FISHERIES
INLAND FISHERIES SECTION

PART VI -B

WATERBODY MANAGEMENT PLAN SERIES

LOWER SABINE RIVER

WATERBODY EVALUATION & RECOMMENDATIONS

CHRONOLOGY

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Eric Shanks, Biologist Manager, District 5

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WATERBODY EVALUATION

STRATEGY STATEMENT

Recreational

Black basses, crappies and catfishes are managed in the lower Sabine River to provide sustainable populations while giving anglers the greatest opportunity to catch and harvest a limit of fish. Sunfishes are managed to provide a sustainable population while providing anglers the opportunity to catch and harvest numbers of fish.

Commercial

Commercial species are managed with statewide regulations to provide a maximum sustainable yield.

Species of Special Concern

The following species are listed or recommended for listing as species of conservation concern for the Sabine River drainage in LDWF's State Wildlife Action Plan:

Fish

Paddlefish, *Polyodon spathula*
Western Sand Darter, *Ammocrypta clara*
Bigscale Logperch, *Percina macrolepida*
Suckermouth Minnow, *Phenacobius mirabilis*
*American Eel, *Anguilla rostrata*
*Shoal Chub, *Macrhybopsis hyostoma*
*Ironcolor Shiner, *Notropis chalybaeus*
*Blue Sucker, *Cycleptus elongatus*
*Redspot Darter, *Etheostoma artesiae*
*Gumbo Darter, *Etheostoma thompsoni*

*Note: asterisks indicate species recommended for listing as species of conservation concern in the 2014 State Wildlife Action Plan at the time of this writing.

The harvest of paddlefish is prohibited in the lower Sabine River. Other species are monitored for presence/absence in standardized river sampling.

EXISTING HARVEST REGULATIONS

Recreational

Special regulations are in place on the lower Sabine River (Table 1).

Table 1. Current border water regulations in effect for the lower Sabine River, Louisiana and Texas.

Sabine River*		
*River proper from the Toledo Bend Dam downstream to the Interstate 10 Bridge and river proper upstream from Toledo Bend Reservoir to the point at which the entire river enters Texas (state line is marked with a sign).		
Species	**Size Limit**	**Bag and Possession Limit**
Channel and Blue catfish	None	50 daily in aggregate; no more than 5 fish over 20" total length (TL)
Flathead catfish	18" minimum length limit (MLL)	10 daily
Striped or Hybrid Bass	None	5 daily in aggregate; no more than two fish over 30" TL
White bass	None	25 daily
Yellow bass	None	No limit
Largemouth and Spotted bass	14" MLL for Largemouth Bass No MLL for Spotted Bass	8 daily in the aggregate
Black and White Crappies	None	25 daily
Sunfish	None	None
Paddlefish	No Take	No Take

For all other species not listed, and those parts of the river outside the description above, respective state regulations apply to territorial waters. The complete Louisiana recreational fishing regulations may be viewed at the following link:
http://www.wlf.louisiana.gov/fishing/regulations

The complete Texas recreational fishing regulations may be viewed at the following link:
http://www.tpwd.state.tx.us/regulations/outdoor-annual/fishing/

Commercial

There are no uniform boundary water regulations on commercial fishing in the lower Sabine River. Respective state commercial fishing regulations apply to individual state territorial waters. Current Louisiana commercial fishing regulations may be viewed at:
http://www.wlf.louisiana.gov/fishing/regulations

Texas commercial fishing regulations may be viewed at:
http://www.tpwd.state.tx.us/publications/pwdpubs/media/pwd_bk_v3400_0074.pdf

SPECIES EVALUATION

Recreational

Largemouth bass

Electrofishing is the predominant sampling technique used to assess largemouth bass (LMB) relative abundance (i.e., catch per unit effort = CPUE) and size distribution on the lower Sabine River. Data collected during spring and fall electrofishing are used to describe population trends, age composition, growth rate, mortality rate and the genetic composition of a LMB population.

Largemouth bass size distribution, relative weight, and relative abundance

Length frequencies generated from standardized sampling results from 2000-2013 show that 97.0% of LMB collected from the lower Sabine River were less than 14" TL (Figure 1). This may be partially attributable to the dynamic nature of river systems where the amount of aquatic habitat changes seasonally leading to increased natural mortality and intraspecific competition during low water conditions. This may also be partially attributable to non-seasonal water temperature and elevation changes due to pulsed water releases from power generation upstream. Mean relative weights are at or above 94 for all inch groups, indicating an adequate forage base for LMB (Figure 1).

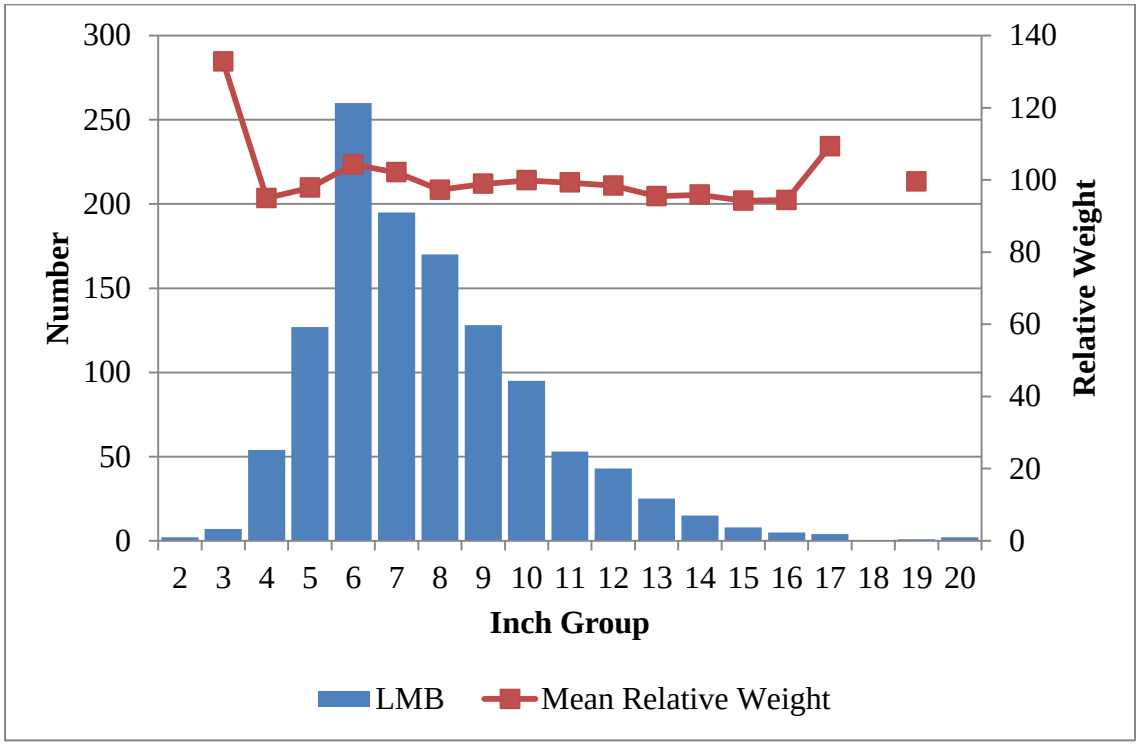

Figure 1. Size distribution (inch groups) and mean Wr by inch group of largemouth bass collected in standardized electrofishing samples from lower Sabine River, LA 2000-2013 (n=1,194).

Standardized spring electrofishing results indicate low relative abundance of LMB from 1994-2005 (Figure 2). No LMB were captured in 2006 spring sampling efforts, primarily due to fish kills associated with Hurricane Rita in fall 2005. Total abundance significantly increased in 2007-2008 and the abundance of stock-sized fish increased in 2008 indicating a

rapid natural recovery of LMB stocks. The effects of high spring flood pulses on bass in river systems are reflected in the CPUE of LMB in 2010. The lower Sabine River experienced significant flooding in March through May and October through December of 2009 which resulted in increased recruitment. The fall flooding provided additional habitat and feeding opportunities for the abundance of young-of-the-year (YOY) LMB during what is normally low water conditions. Since that time (2011-2013), LMB abundance has been gradually returning to "normal" carrying capacity for the lower Sabine River (<50 bass/hour, Figure 2).

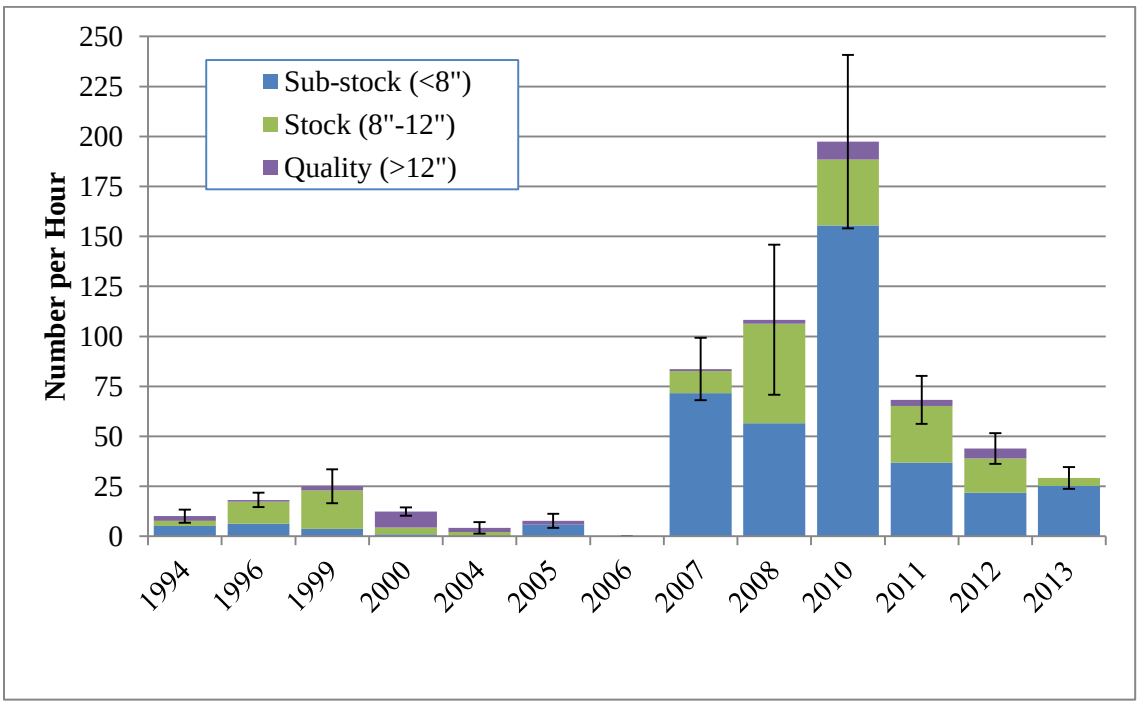

Figure 2. Mean CPUE (± SE) for largemouth bass by size class from standardized spring electrofishing samples 1994-2013 for lower Sabine River, LA. Error bars represent standard error of total mean CPUE.

Standardized fall electrofishing samples were collected more frequently than spring samples, primarily due to consistent fall water levels. These results show variable CPUE and are similar to spring samples with relatively low catch rates (≤50 bass/hour) through 2003 (Figure 3). The rapid recovery of the LMB population after Hurricane Rita was documented in 2006 and 2007. Record high CPUE values were recorded for both years. Catch rates returned to pre-hurricane levels from 2008-2013.

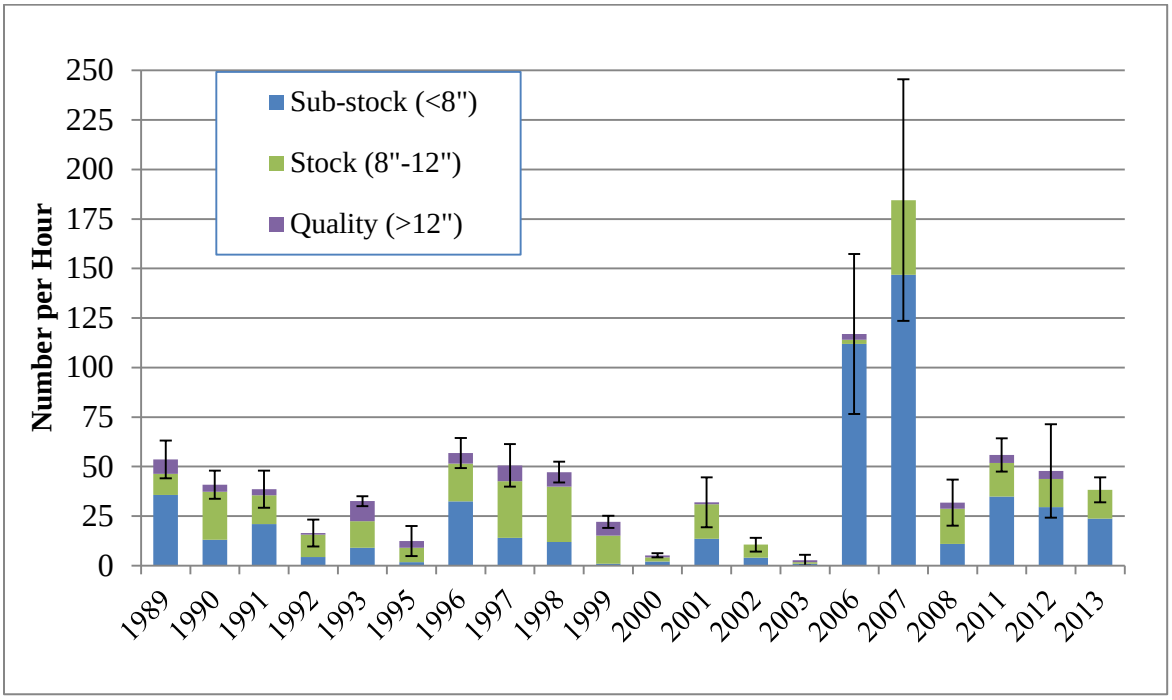

Figure 3. Mean CPUE (± SE) for largemouth bass by size class from standardized fall electrofishing samples 1989-2013 for lower Sabine River, LA. Error bars represent standard error of total mean CPUE.

Size structure indices

Proportional stock density (PSD) and relative stock density (RSD) are indices used to numerically describe length-frequency data (Anderson and Neumann 1996). Proportional stock density compares the number of fish of quality size (greater than 12 inches for largemouth bass) to the number of bass of stock size (greater than 8 inches in length), and is calculated by the formula:

$$PSD = \frac{\text{Number of bass} \geq 12 \text{ inches}}{\text{Number of bass} \geq 8 \text{ inches}} \times 100$$

PSD is expressed as a percentage. A fish population with a high PSD consists mainly of larger individuals. A population with a low PSD consists mainly of smaller fish. A value between 40 and 70 generally indicates a balanced bass population. On the lower Sabine River, both spring and fall PSD's are generally less than 40, indicating the population is comprised of smaller fish (Figures 4 and 5). The exceptions to these consistently low spring PSD values (1994, 2000, 2004, and 2005) coincided with very low catch rates (<15 bass/hour). Fall PSD values over 40 (1989, 1993, 2003, and 2006) were not correlated with catch rates and ranged from 2.7 bass/hour to 117 bass/hour (Figure 3).

Relative stock density (RSD_{15}) is the percentage of largemouth bass in a stock (fish over 8 inches) that are 15 inches TL or longer, and is calculated by the formula:

$$RSD_{15} = \frac{\text{Number of bass} \geq 15 \text{ inches}}{\text{Number of bass} \geq 8 \text{ inches}} \times 100$$

An RSD_{15} value between 10 and 40 indicates a balanced bass population, while values between 30 and 60 indicate a higher abundance of larger fish. Spring RSD_{15} values are frequently zero, and only exceeded 10% in 2000 and 2005 (Figure 4). Fall RSD_{15} values only reached or exceeded 10% in 1993, 1999, and 2006 (Figure 5). The LMB population in

the lower Sabine River has not had an abundance of larger fish in any year sampled. While spring 2005 indices show a high proportion of larger fish (Figure 4), relative abundance was low for that sample (Figure 2). The overall PSD and RSD_{15} results may be indicative of variable recruitment often associated with dynamic river systems (Neumann et al. 2012).

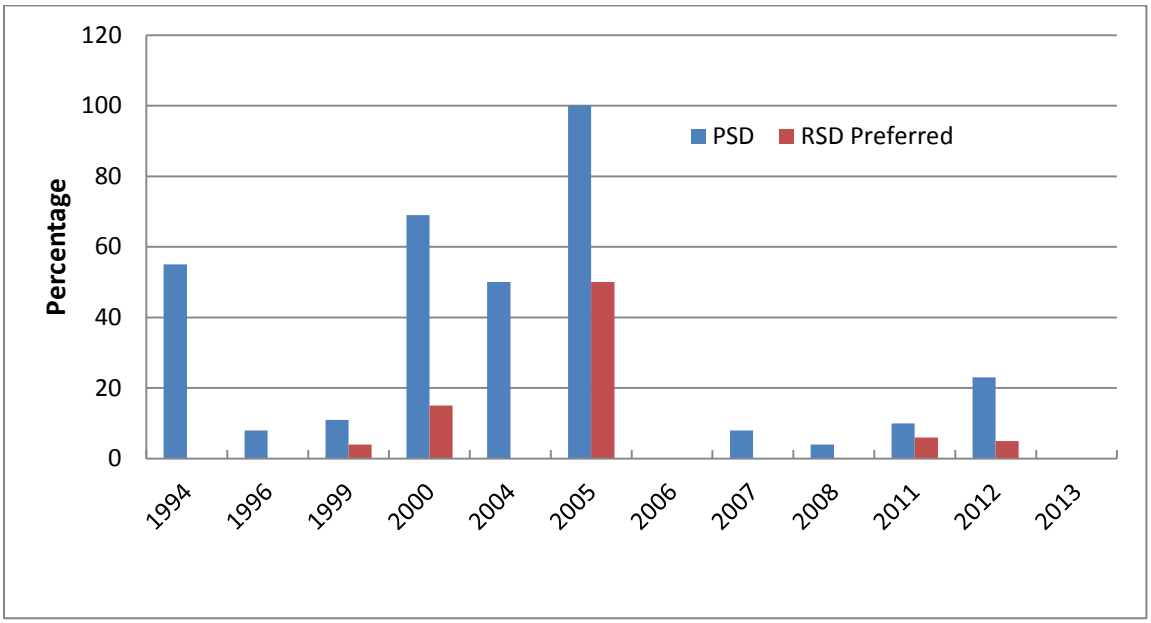

Figure 4. Proportional stock density and relative stock density (preferred) for largemouth bass from spring electrofishing on lower Sabine River, LA, for 1994 – 2013.

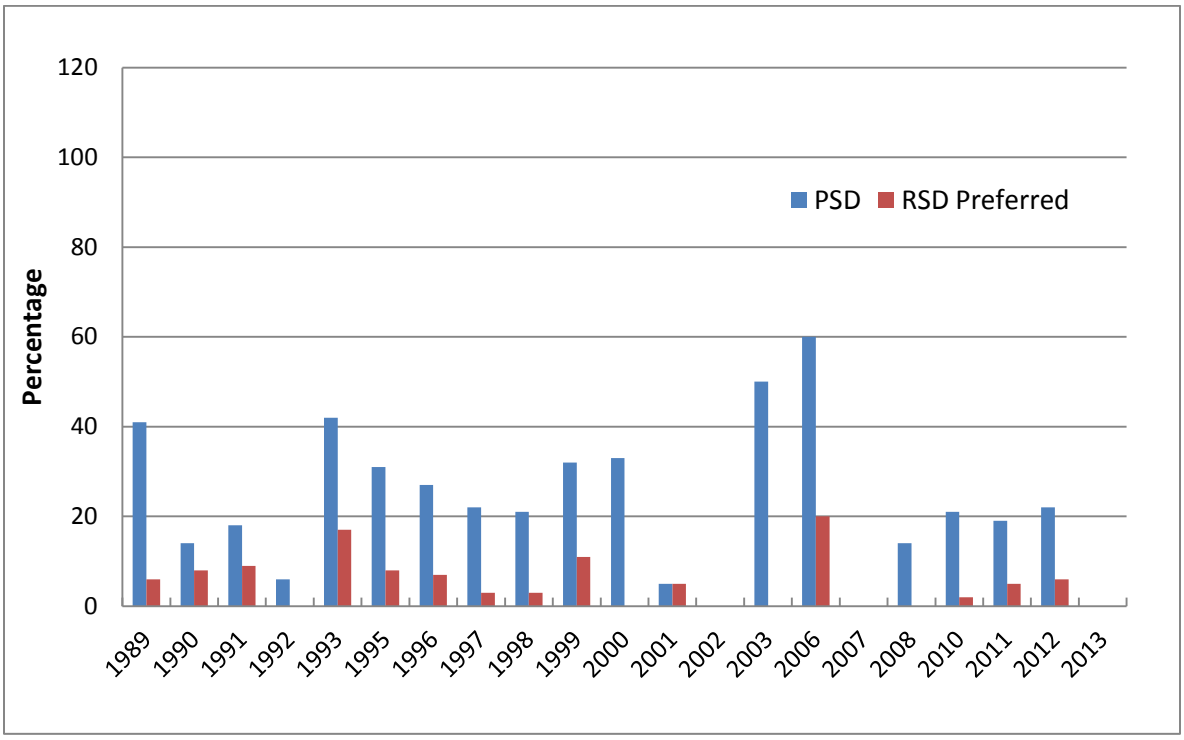

Figure 5. Proportional stock density and relative stock density (preferred) for largemouth bass from fall electrofishing on lower Sabine River, LA for 1989 – 2013.

Spotted Bass

Spotted bass comprise between 10% and 15% of black bass captures in standardized electrofishing samples. As the river habitat transitions to a shallower, sandy bottom, spotted bass become more abundant until they comprise up to 90% of black bass populations in the upper river. Length frequencies generated from standardized sampling results from 2000-2013 show 99.5% of spotted bass collected from the lower Sabine River were less than 14" TL (Figure 6).

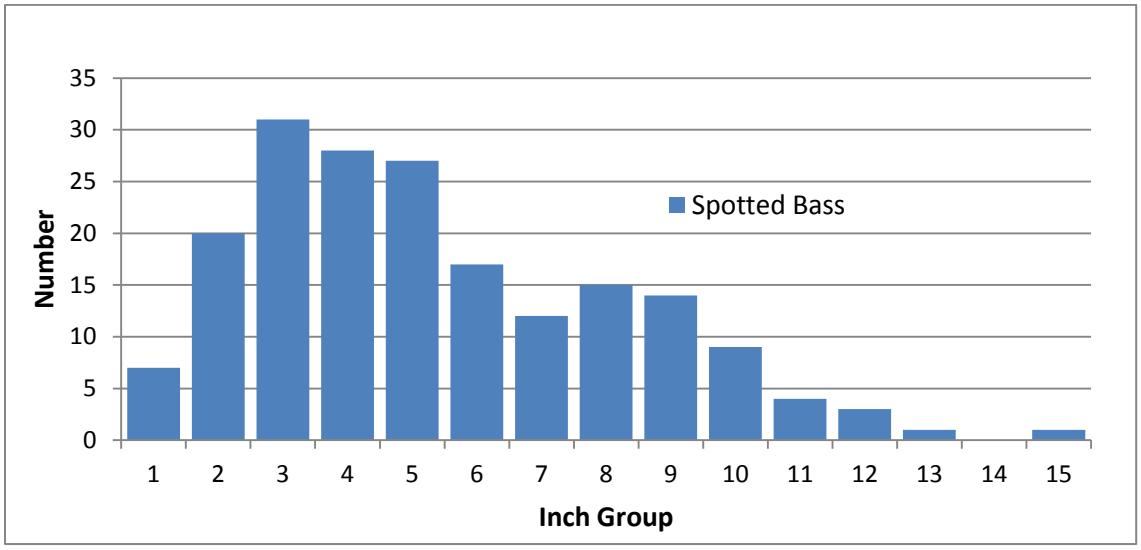

Figure 6. Size distribution (inch groups) of spotted bass collected in standardized electrofishing samples from lower Sabine River, LA 2000-2013 (n=189).

Forage

Forage availability for bass is typically measured directly through electrofishing and indirectly through measurement of body condition or relative weight. The species composition of the forage base depends heavily on sample location. Due to the location of LDWF fixed sample sites in and around Sabine Island WMA, sunfish (*Lepomis spp.*) generally comprise the majority of the forage base (Figure 7). Minnows and shiners (Cyprinids), primarily blacktail shiners (*Cyprinella venusta*) and weed shiners (*Notropis texanus*), also comprise a significant portion of the forage base. Other species include: bay anchovy (*Anchoa mitchilli*); gulf menhaden (*Brevoortia patronus*); topminnows (*Fundulus spp.*); and brook silversides (*Labidesthes sicculus*). In 2011, LDWF forage sampling protocols were changed to attempt to more accurately reflect forage availability by increasing sampling sites while decreasing sampling duration.

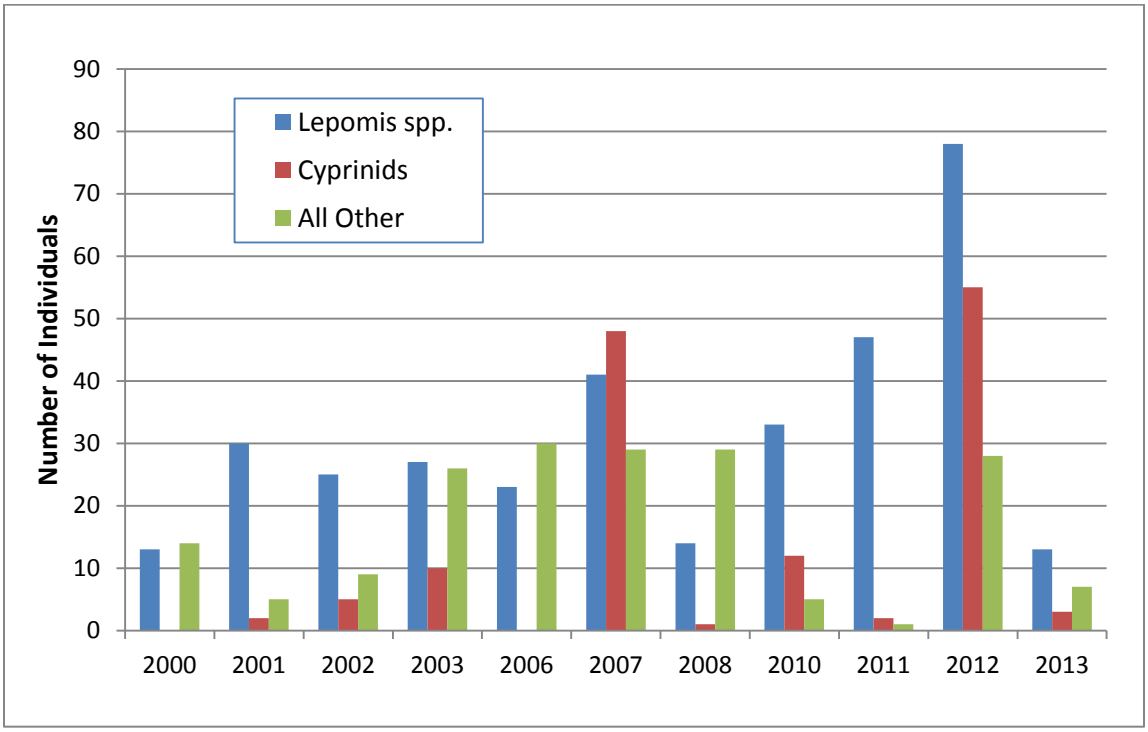

Figure 7. Number of *Lepomis spp*, Cyprinids, and all other forage species ≤ 6 inches TL captured in standardized fall forage electrofishing samples from 2000-2013 on the lower Sabine River, LA.

Other Species

In 2002, LDWF initiated standardized big river sampling utilizing multiple gears to develop baseline data on the riverine fish species community. A total of 8,778 individuals were collected representing 69 species from August 2002 to August 2013 (Table 2). In addition to LDWF data collections, Texas Parks and Wildlife has conducted sampling on the lower Sabine River as part of their River Studies Program. Results of this sampling may be viewed at the following link: Sabine River- Texas River Studies Program

From 2010 through 2011, BIO-WEST Inc. conducted a study on the lower Sabine fisheries resources as part of the Sabine River Authority's Toledo Bend relicensing process. Results of this study may be found at the following link: SRA - FERC Relicensing Process

Table 2. Total number collected by species in LDWF lower Sabine big river sampling efforts from August 2002-August 2013.

Species	Number	Species (cont.)	Number
Alligator Gar	1	Longear Sunfish	412
Atlantic Needlefish	10	Longnose Gar	17
Bay Anchovy	163	Mimic Shiner	155
Black Crappie	11	Orangespotted Sunfish	43
Blackspotted Topminnow	49	Pallid Shiner	210
Blackstripe Topminnow	16	Pirate Perch	1

Blacktail Redhorse	23	Pugnose Minnow	7
Blacktail Shiner	3810	Red Drum	2
Blue Catfish	144	Red Shiner	1
Blue Crab	5	Redear Sunfish	18
Blue Sucker	5	Redspotted Sunfish	14
Bluegill	166	Ribbon Shiner	127
Bluntnose Darter	1	River Carpsucker	6
Bowfin	3	River Shrimp	635
Brook Silverside	13	Sabine Shiner	52
Bullhead Minnow	587	Scaly Sand Darter	6
Channel Catfish	111	Shoal chub	78
Crawfish	1	Shortnose Gar	1
Darter	1	Silvery Minnow	65
Dollar Sunfish	3	Smallmouth Buffalo	13
Dusky Darter	10	Southern Flounder	1
Flathead Catfish	13	Spotted Bass	170
Flier	1	Spotted Gar	47
Freshwater drum	39	Spotted Sucker	51
Ghost Shiner	14	Striped Mullet	176
Gizzard Shad	176	Suckermouth Minnow	1
Golden Shiner	1	Threadfin Shad	25
Grass Shrimp	17	Warmouth	4
Gulf Menhaden	15	Weed Shiner	916
Harlequin Darter	1	Western Mosquito Fish	23
Hogchoker	8	Western Sand Darter	1
Hybrid Sunfish	2	White Bass	5
Inland Silverside	21	White Crappie	4
Ladyfish	4	White Mullet	8
Largemouth Bass	38		

Commercial

Due to the limited number of participants in commercial fishing activities on the lower Sabine River, commercial landing data is confidential and not available for this document.

Species of Special Concern

Paddlefish, *Polyodon spathula*—No specimens have been collected during LDWF standardized big river sampling. Recommended for state ranking S4

Western Sand Darter, *Ammocrypta clara*— One specimen was collected by LDWF in 2009 river sampling efforts. State ranking S2

Bigscale Logperch, *Percina macrolepida*—No specimens have been collected during LDWF standardized big river sampling. State ranking S1/S2

Suckermouth Minnow, *Phenacobius mirabilis*—One specimen was collected by LDWF in 2007 river sampling efforts. State ranking S1

American Eel, *Anguilla rostrata*— No specimens have been collected during LDWF standardized big river sampling. Recommended for state ranking S4.

Shoal Chub, *Macrhybopsis hyostoma*—78 specimens have been collected by LDWF from 2004-2010 river sampling efforts. Recommended for state ranking S3.

Ironcolor Shiner, *Notropis chalybaeus*—No specimens have been collected during LDWF standardized big river sampling. Recommended for state ranking S3.

Blue Sucker, *Cycleptus elongates*—5 blue sucker specimens have been collected by LDWF from 2002-2013 river sampling efforts. Recommended for state ranking S3.

Redspot Darter, *Etheostoma artesiae*—No specimens have been collected during LDWF standardized big river sampling. Recommended for state ranking S3.

Gumbo Darter, *Etheostoma thompsoni*—No specimens have been collected during LDWF standardized big river sampling. Recommended for state ranking S2.

Table 3. Explanation of state rankings for species of special concern from 2005 LDWF Wildlife Action Plan.

Rank	Explanation
S1	Critically imperiled in Louisiana because of extreme rarity (5 or fewer known extant populations) or because of some factor(s) making it especially vulnerable to extirpation.
S2	Imperiled in Louisiana because of rarity (6 to 20 known extant populations) or because of some factor(s) making it vulnerable to extirpation.
S3	Rare and local throughout the state or found locally (even abundantly at some of its locations) in a restricted region of the state, or because of other factors making it vulnerable to extirpation (21 to 100 known extant populations).
S4	Apparently secure in Louisiana with many occurrences (100 to 1,000 known extant populations).

HABITAT EVALUATION

Fish spawning habitat

As with most river systems, available spawning habitat for many species varies with the spring flood pulse. High water years flood batture areas and increase connectivity with adjacent waters to providing abundant fish nesting habitat. In low water years, spawning habitat is limited to the main river channel and connected swamps and marshes. The Toledo Bend Hydropower Project affects fish spawning habitat in three ways: 1) reduces magnitude of spring flood pulses; 2) cold water (hypolimnion) releases cause sudden temperature and

depth changes that can have negative impacts on spawning fish; and 3) the dam acts as a barrier to migratory fish and invertebrate species. Variable spring flood pulses and changes in the natural hydrology mean spawning habitat is sometimes a limiting factor for sport fish on the lower Sabine River.

Juvenile fish habitat

Juvenile habitat for centrarchids also varies with spring rises, with high water years providing good access to flooded batture lands containing abundant woody debris cover. Lack of juvenile habitat in low water years can reduce recruitment by forcing juvenile fish into the main river channel increasing the likelihood of predation. Juvenile habitat is sometimes a limiting factor on the lower Sabine River.

Adult fish habitat

Adult habitat varies by season and is also affected by power generation flows and schedules in some parts of the river. Habitat during summer and fall is limited to the normal confines of the river, and in some years, cannot support the abundance of YOY fish produced during the spring flood pulse. For this reason, adult habitat is a limiting factor on the lower Sabine River.

Fertility

Overall fertility is dependent on soil fertility in the watershed. Toledo Bend Reservoir acts as a nutrient sink for that part of the watershed above the dam. The lower watershed consists primarily of relatively less fertile soils. Overall, fertility is a limiting factor in the lower Sabine River.

Problem Vegetation

Due to swift currents and sandy substrates in much of the river, there are generally no vegetation problems on the main lower Sabine River. Problem vegetation consists primarily of common (*Salvinia minima*) and giant (*S. molesta*) salvinia in scar channels, oxbows, swamps, and marshes associated with the river. Many of these areas are privately owned, and/or inaccessible.

Predicted problem vegetation coverage on public waters of the lower Sabine River for fall 2014:

Common salvinia: 100 acres
Water hyacinth: 100 acres
Alligator weed: 100 acres
Giant salvinia: 100 acres

Substrate

The majority of the lower Sabine River substrate is river sand. The lower third of the river has primarily silt/sand substrates.

Artificial Structure

There are no artificial structures present in the lower Sabine River.

CONDITION IMBALANCE / PROBLEM

Changes to natural hydrology of the river resulting from the construction of the Toledo Bend dam and related power generation activities is the primary habitat imbalance on the lower Sabine River.

CORRECTIVE ACTION NEEDED

The minimization and mitigation of impacts to aquatic habitats downstream of Toledo Bend dam.

RECOMMENDATIONS

1) Continue participating in the Toledo Bend FERC relicensing process to promote the benefits of modifying power generation operations, where feasible, to more closely mimic the natural hydrological flows of the river.

2) Shift focus of standardized river sampling from main river channel to tributary streams.

3) Continue standardized sport fish monitoring to document effects of 14" MLL on largemouth bass population.

4) In accordance with the approved LDWF Aquatic Herbicide Recommendations, conduct herbicide treatments on Lake Bienvenue and other potential problem areas on an "as needed" basis for control of giant salvinia. A mix of glyphosate (0.75 gal/acre) and diquat (0.25 gal/acre) with Aqua King Plus (0.25 gal/acre) and Air Cover (12 oz/acre) surfactants will be used to target giant and common salvinia. If infestations are primarily primrose and alligator weed, imazapyr should be used at 0.5 gal/acre with Turbulence surfactant (0.25 gal/acre). Infestations consisting of primarily water hyacinth should be treated with 2,4-D at 0.5 gal/acre.

5) Continue public outreach efforts to get private landowners in the watershed to utilize the LDWF/LSU AgCenter weevil stocking program for control of giant salvinia on private property.

6) Continue to monitor Lake Bienvenue to determine success of previous LDWF weevil stockings.

REFERENCES

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